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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/025,399	12/17/2001	Ai Quoc Pham	IL-10824	4886

7590 10/30/2002

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EXAMINER	
CANTELMO, GREGG	
ART UNIT	PAPER NUMBER
1745	4

DATE MAILED: 10/30/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/025,399	Applicant(s) PHAM ET AL.	
	Examiner Gregg Cantelmo	Art Unit 1745	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____ .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-20* is/are pending in the application.

4a) Of the above claim(s) *10* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-9 and 11-20* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *08 March 2001* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 2 .
4) ☒ Interview Summary (PTO-413) Paper No(s). 3 .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other:

DETAILED ACTION

Election/Restrictions

1. Restriction to one of the following inventions is required under 35 U.S.C. 121:

   I. Claims 1-9 and 11-20, drawn to a SOFC, classified in class 429, subclass 27.

   II. Claim 10, drawn to a coating method, classified in class 427, subclass 115.

The inventions are distinct, each from the other because of the following reasons:

2. Inventions I and II are related as process of making and product made. The inventions are distinct if either or both of the following can be shown: (1) that the process as claimed can be used to make other and materially different product or (2) that the product as claimed can be made by another and materially different process (MPEP § 806.05(f)). In the instant case the product can be made by a materially different process such as plasma spraying, spin coating, dip coating, electrophoretic deposition, slurry painting, etc.

3. Because these inventions are distinct for the reasons given above and have acquired a separate status in the art as shown by their different classification, restriction for examination purposes as indicated is proper.

4. Because these inventions are distinct for the reasons given above and the search required for Group II is not required for Group I, restriction for examination purposes as indicated is proper.

5. Because these inventions are distinct for the reasons given above and have acquired a separate status in the art because of their recognized divergent subject matter, restriction for examination purposes as indicated is proper.

6. During a telephone conversation with Mr. Alan H. Thompson on October 22, 2002 a provisional election was made with traverse to prosecute the invention of Group I, claims 1-9 and 11-20. Affirmation of this election must be made by applicant in replying to this Office action. Claim 10 is withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

7. Applicant is reminded that upon the cancellation of claims to a non-elected invention, the inventorship must be amended in compliance with 37 CFR 1.48(b) if one or more of the currently named inventors is no longer an inventor of at least one claim remaining in the application. Any amendment of inventorship must be accompanied by a request under 37 CFR 1.48(b) and by the fee required under 37 CFR 1.17(i).

Priority

8. This application claims benefit of U.S. provisional Application Serial No. 60/274,200, filed March 8, 2001.

Information Disclosure Statement

9. The information disclosure statement filed December 17, 2001 has been placed in the application file and the information referred to therein has been considered as to the merits.

Drawings

10. The drawings received December 17, 2001 are acceptable for examination purposes.

Specification

11. The disclosure is objected to because of the following informalities: the priority claim on page 1 of the specification is not at the first line of the specification. In particular paragraph [0001] precedes the priority claim. See 37 CFR 1.78 (a) (5), incorporated herein. Applicant is advised to correct the location of the priority statement and further to update the status of this Application. Further the status of the application listed on page 6, line 2 should also be updated. Appropriate correction is required.

12. The specification is objected to as failing to provide proper antecedent basis for the claimed subject matter. See 37 CFR 1.75(d)(1) and MPEP § 608.01(o). Correction of the following is required: claims 1-9 and 11 recite a preamble which appears to be in Jepson format (use of the language "the improvement comprising"). This suggests then that operation of SOFCs in a range of 400-700° C is conventional. However from examination of the specification, there is no explicit recitation of this Jepson format apart from what is presented in the claims. It would further appear from reading the background art and the disclosure of the instant invention that there is no clear admission that SOFCs operated at a range of 400-700° C is conventional. It appears that the lower operational temperatures for the particular claimed materials in the SOFC may be an improvement over the prior art operational temperatures. Pending

Applicants response, and in view of the disclosure of the originally filed application, the examiner has not interpreted the claim language of claims 1-9 and 11 as a clear Jepson claim since the operation temperatures may not be explicitly conventional. If Applicant concurs that the Jepson format is not applicable, the Examiner suggests amending claims 1-9 and 11 to remove the language "the improvement" so as not to confuse what limitations are admittedly conventional and those that are not.

Claim Objections

13. Claims 4-5 are objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. With respect to claims 4 and 5: the pore former is not clearly understood as an integral component of the final fuel cell product. In particular the pore former, starch or carbon, appears germane to the method of forming the fuel cell as claimed and therefore is not a feature present in the end product of the claims. Thus in the context of the claimed invention, the pore formers are not integral to the fuel cell but are a process application step for forming the end product. However for the record, art has been applied to show that such a process is known in the art and even as an intermediate component of the fuel cell, the presence of such materials as pore-formers in fuel cells are known in the art and obvious (discussed below, also see the 112 second paragraph rejection).

14. Claim 11 is objected to because of the following informalities: Claim 11 recites the term "forming an electrode of the fuel cells from a cobalt, iron, manganese based material". The electrode of claim 11 is deemed to be the cathode as recited in claim 1 and the term "an electrode" should be amended to --the cathode--. Second it may be that the term "fuel cells" (plural) is a typographical error since there is only basis for one fuel cell (note that claim 11 is dependent upon claim 1). Appropriate correction is required.

Claim Rejections - 35 USC § 112

15. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

16. Claims 2-5, 11 and 17 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

a. Claims 2 and 17 recite the anode as "NiO/doped ceria." The claim language is indefinite since it the combination of materials in the anode are not particularly clear as recited in the claims. The language could be construed as NiO doped with ceria or possibly ceria doped with NiO. However it is apparent from the specification that the dopant is a material other than these two constituents. Applicant is advised to amend the claims to clearly indicate that the anode comprises NiO and doped-ceria.

b. With respect to claims 4 and 5: the pore former is not clearly understood as an integral component of the final fuel cell product. Thus the positive features of the

fuel cell are not clearly defined. In particular the pore former, starch or carbon, appears germane to the method of forming the fuel cell of claim 1 and therefore is not a feature present in the fuel cell. The pore formers are likely used in a process application step for forming a porous component in the fuel cell. It would seem that in order for the pore formers to effectively form pores, they would need to be removed from the material(s) they are included in to effectively generate the pores. If the pore formers of claims 4 and 5 are not removed from the material(s) in which the pore formers are disposed, the pore formers would fill the would-be pores thereby failing to function as pore formers. Pending Applicants, response, and further for the record, art has been applied to show that such a process is known in the art and if such a material is understood as an intermediate component of the fuel cell during the formation of the cell, the presence of such materials as pore-formers in fuel cells are known in the art and obvious (discussed below).

b. Claim 11 recites the limitation "the fuel cells" in line 2. There is insufficient antecedent basis for this limitation in the claim. Claim 1 has basis for only one fuel cell and not plural cells;

c. While applicant may be his or her own lexicographer, a term in a claim may not be given a meaning repugnant to the usual meaning of that term. See *In re Hill*, 161 F.2d 367, 73 USPQ 482 (CCPA 1947). The term "elements" in claim 3 is used by the claim to mean "compounds," while the accepted meaning is "elements." Fundamental chemistry defines the term element as a substance composed of atoms having an identical number of protons in each nucleus. Elements cannot be reduced to simpler

substances by normal chemical means. The materials listed in the genus of claim 3 are not elements since they are composed of atoms having different number of protons in each nucleus and further can be reduced to simple substance by normal chemical means.

Claim Rejections - 35 USC § 103

17. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

18. Claims 1-3, 6-9 and 12-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. patent No. 5,350,641 (Mogensen) in view of EP 0 275 356 A (EP '356) and U.S. patent No. 5,937,264 (Wallin).

With respect to claims 1-3 and 6-9:

Mogensen discloses a solid oxide fuel cell (SOFC), comprising an anode including doped ceria, and electrolyte and a cathode (abstract and col. 3, line 9 through col. 4, line 4 as applied to claim 1). Note that the operating temperature of claim 1 does not further limit the SOFC fuel cell system and is not accorded patentable weight since it is an intended operational use of the fuel cell of claim 1. See MPEP § 2111.02, incorporated herein. An intended use clause in the preamble is not afforded the effect of a distinguishing limitation when the body of the claim does not set forth structure

which refers back to or is defined by, or otherwise "draws life and breath" from the temperature range in the preamble. A claim containing a "recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus" if the prior art apparatus teaches all the structural limitations of the claim. Ex parte Masham, 2 USPQ2d 1647 (Bd. Pat. App. & Inter. 1987). See MPEP § 2114, incorporated herein. A preamble is generally not accorded any patentable weight where it merely recites the purpose of a process or the intended use of a structure, and where the body of the claim does not depend on the preamble for completeness but, instead, the process steps or structural limitations are able to stand alone. See In re Hirao, 535 F.2d 67, 190 USPQ 15 (CCPA 1976) and Kropa v. Robie, 187 F.2d 150, 152, 88 USPQ 478, 481 (CCPA 1951). Furthermore, the prior art obviating claim 1 would have a reasonable expectation of success for operation within the temperature range in the preamble of claim 1, absent clear evidence to the contrary.

The anode is composed of NiO/doped ceria (col. 2, ll. 19-52 as applied to claim 2).

The doping material in the ceria can be gadolinium oxide, lanthanide oxide and yttria oxide (col. 4, ll. 1-3 as applied to claim 3).

The differences between the instant claims and Mogensen are that Mogensen does not teach of the electrolyte containing doped-ceria (claims 1 and 6) or of the cathode containing a cobalt iron based material (claim 1) and more particularly a cathode material of either $(La,Sr)(Co,Fe)O_3$ or $(La,Ca(Co,Fe,Mn)O_3$ (claim 7) of the fuel

cell operating at a temperature in the range of 400-700° C (claim 1) of the doped-ceria comprising doped-ceria formed from a process of colloid spray deposition or aerosol spray casting (claim 8), wherein the cobalt iron based material is deposited by colloid spray deposition or aerosol spray casting (claim 9).

With respect to the electrolyte containing doped ceria (claims 1 and 6):

The electrolyte of Mogensen is YSZ (yttria stabilized zirconia).

EP '356 discloses that doped ceria electrolytes (CeO_2 doped with materials such as CaO or Gd_2O_3) compared to zirconia based electrolytes are preferable since the exhibit higher conductivity that the zirconia based electrolytes and can be operated at lower temperatures (page 3, ll. 42-45).

The motivation for using doped-ceria electrolyte is that it would have improved the conductivity of the electrolyte and further reduced the operating temperature of the SOFC.

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of Mogensen by using doped-ceria electrolyte since it would have improved the conductivity of the electrolyte and further reduced the operating temperature of the SOFC.

With respect to the cathode containing cobalt iron based material (claims 1 and 7):

Wallin discloses of an electrode/electrolyte combination used in solid oxide fuel cells (abstract, col. 1, ll. 12-20, and col. 3, ll. 13-15 and 56-65) wherein the ion-

conducting material in the electrode is a number of perskovite compositions. In particular when the ionically conductive material is ceria or doped ceria, Wallin teaches that the electrocatalyst in the electrode is preferably a cobalt iron based material, and further a $LaSrFeCoO_3$ material (col. 6, ll. 7-9).

The motivation for using a cobalt iron based cathode material including $LaSrFeCoO_3$ is that it lowers the internal resistance of the fuel cell based on the optimal selection of the electronically conductive material and electrocatalyst (abstract).

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of Mogensen by selecting the cathode to be a cobalt iron based cathode material including $LaSrFeCoO_3$ since it would have lowered the internal resistance of the fuel cell based on the optimal selection of the electronically conductive material and electrocatalyst. The selection of a known material based on its suitability for its intended use supported a prima facie obviousness determination in Sinclair & Carroll Co. v. Interchemical Corp., 325 U.S. 327, 65 USPQ 297 (1945) See also In re Leshin, 227 F.2d 197, 125 USPQ 416 (CCPA 1960). MPEP § 2144.07.

With respect to the doped-ceria and cobalt iron based cathode each being formed from colloidal spray deposition or aerosol spray casting (respective claims 8 and 9):

These claims do not further define the structure of the claims and are instead drawn to the process of making the particular components in each claim.

"[E]ven though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process." In re Thorpe, 777 F.2d 695, 698, 227 USPQ 964, 966 (Fed. Cir. 1985) (citations omitted).

"The Patent Office bears a lesser burden of proof in making out a case of prima facie obviousness for product-by-process claims because of their peculiar nature" than when a product is claimed in the conventional fashion. In re Fessmann, 489 F.2d 742, 744, 180 USPQ 324, 326 (CCPA 1974). Once the Examiner provides a rationale tending to show that the claimed product appears to be the same or similar to that of the prior art, although produced by a different process, the burden shifts to applicant to come forward with evidence establishing an unobvious difference between the claimed product and the prior art product. In re Marosi, 710 F.2d 798, 802, 218 USPQ 289, 292 (Fed. Cir. 1983). Ex parte Gray, 10 USPQ2d 1922 (Bd. Pat. App. & Inter. 1989). See MPEP section 2113.

In the instant case, the prior art rejection obviates the use of doped-ceria as the electrolyte, thus the end product is obvious. Since the claimed invention is drawn to the fuel cell and not a method of making the fuel cell, the manner in which the doped-ceria is not germane to the claimed invention absent clear evidence to the contrary.

With respect to claims 12-17:

Mogensen discloses a solid oxide fuel cell (SOFC), comprising an anode including doped ceria (abstract and col. 3, line 9 through col. 4, line 4) and a methane fuel (col. 2, ll. 56 as applied to claim 12).

The fuel source of Mogensen can be either hydrogen or methane. The operating temperature of claim 14 does not further limit the SOFC fuel cell system and is not accorded patentable weight since it is an intended operational use of the fuel cell of claim 14 (col. 2, ll. 54-57 as applied to claim 14). A claim containing a "recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus" if the prior art apparatus teaches all the structural limitations of the claim. Ex parte Masham, 2 USPQ2d 1647 (Bd. Pat. App. & Inter. 1987). See MPEP § 2114, incorporated herein.

The anode is composed of NiO/doped ceria (col. 2, ll. 19-52 as applied to claim 17).

The differences between the instant claims and Mogensen are that Mogensen does not teach of the electrolyte containing doped-ceria (claim 12) or of the cathode containing a cobalt iron based material (claim 12), of the fuel cell operating in a temperature range of 400-700° C (claim 13), operating the cell at about 550° C (claim 14), of operating the of the fuel being hydrogen and a power output of up to 400 mW/cm^2 is produced at an operating temperature of 550° C (claim 15), of the fuel being methane and wherein a power output of 320 mW/cm^2 is produced at an operating temperature of 550° C (claim 16).

With respect to an electrolyte containing doped ceria (claim 12):

The electrolyte of Mogensen is YSZ (yttria stabilized zirconia).

EP '356 discloses that doped ceria electrolytes (CeO_2 doped with materials such as CaO or Gd_2O_3) compared to zirconia based electrolytes are preferable since the exhibit higher conductivity that the zirconia based electrolytes and can be operated at lower temperatures (page 3, ll. 42-45).

The motivation for using doped-ceria electrolyte is that it would have improved the conductivity of the electrolyte and further reduced the operating temperature of the SOFC.

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of Mogensen by using doped-ceria electrolyte since it would have improved the conductivity of the electrolyte and further reduced the operating temperature of the SOFC.

With respect to the cathode containing cobalt iron based material (claim 12):

Wallin discloses of an electrode/electrolyte combination used in solid oxide fuel cells (abstract, col. 1, ll. 12-20, and col. 3, ll. 13-15 and 56-65) wherein the ion-conducting material in the electrode is a number of perskovite compositions. In particular when the ionically conductive material is ceria or doped ceria, Wallin teaches that the electrocatalyst in the electrode is preferably a cobalt iron based material, and further a $LaSrFeCoO_3$ material (col. 6, ll. 7-9).

The motivation for using a cobalt iron based cathode material including $LaSrFeCoO_3$ is that it lowers the internal resistance of the fuel cell based on the optimal selection of the electronically conductive material and electrocatalyst (abstract).

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of Mogensen by selecting the cathode to be a cobalt iron based cathode material including $LaSrFeCoO_3$ since it would have lowered the internal resistance of the fuel cell based on the optimal selection of the electronically conductive material and electrocatalyst. The selection of a known material based on its suitability for its intended use supported a prima facie obviousness determination in Sinclair & Carroll Co. v. Interchemical Corp., 325 U.S. 327, 65 USPQ 297 (1945) See also In re Leshin, 227 F.2d 197, 125 USPQ 416 (CCPA 1960). MPEP § 2144.07.

With respect to the operating temperature of claims 13-16:

As discussed above, EP '356 discloses that the use of doped-ceria electrolytes provide much higher conductivity than zirconia based electrolytes. Thus there is ample motivation for replacing the zirconia electrolyte of Mogensen with a doped-ceria electrolyte to provide an electrolyte having a higher conductivity at lower operational temperatures. The combination of the teachings of Mogensen, EP and Wallin as set forth above teach all of the same components as recited in claims 13-16. Since the components are the same, there is a reasonable expectation of success that the fuel cell described above would effectively operate at an operational temperature of 550° C

and achieve the same power outputs, absent clear evidence to the contrary. A claim containing a "recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus" if the prior art apparatus teaches all the structural limitations of the claim. Ex parte Masham, 2 USPQ2d 1647 (Bd. Pat. App. & Inter. 1987). See MPEP § 2114, incorporated herein.

"[T]he PTO can require an applicant to prove that the prior art products do not necessarily or inherently possess the characteristics of his [or her] claimed product. Whether the rejection is based on inherency' under 35 U.S.C. 102, on prima facie obviousness' under 35 U.S.C. 103, jointly or alternatively, the burden of proof is the same...[footnote omitted]." The burden of proof is similar to that required with respect to product-by-process claims. In re Fitzgerald, 619 F.2d 67, 70, 205 USPQ 594, 596 (CCPA 1980) (quoting In re Best, 562 F.2d 1252, 1255, 195 USPQ 430, 433-34 (CCPA 1977)). Where the claimed and prior art products are identical or substantially identical in structure or composition, or are produced by identical or substantially identical processes, a prima facie case of either anticipation or obviousness has been established. In re Best, 562 F.2d 1252, 1255, 195 USPQ 430, 433 (CCPA 1977). "When the PTO shows a sound basis for believing that the products of the applicant and the prior art are the same, the applicant has the burden of showing that they are not." In re Spada, 911 F.2d 705, 709, 15 USPQ2d 1655, 1658 (Fed. Cir. 1990). Therefore, the prima facie case can be rebutted by evidence showing that the prior art products do not necessarily possess the characteristics of the claimed product. In re Best, 562 F.2d at

1255, 195 USPQ at 433. See also Titanium Metals Corp. v. Banner, 778 F.2d 775, 227 USPQ 773 (Fed. Cir. 1985). See also In re Ludtke, 441 F.2d 660, 169 USPQ 563 (CCPA 1971); Northam Warren Corp. v. D. F. Newfield Co., 7 F. Supp. 773, 22 USPQ 313 (E.D.N.Y. 1934). See MPEP § 2112.01.

With respect to the power output of the cell at an operational temperature of 550° C (claim 15):

As discussed above, Mogensen teaches that the fuel can be hydrogen. Mogensen in view of EP '356 and Wallin obviates the fuel cell of claim 15. Upon using hydrogen fuel in the cell of Mogensen in view of EP '356 and Wallin, since the composition of the fuel cell and the fuel used are the same as the instant claim, the prior art of record will generate the same power output when operated at a temperature of about 550° C.

A claim containing a "recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus" if the prior art apparatus teaches all the structural limitations of the claim. Ex parte Masham, 2 USPQ2d 1647 (Bd. Pat. App. & Inter. 1987). See MPEP § 2114, incorporated herein.

With respect to the power outputs of the cell at an operational temperature of 550° C (claim 16):

As discussed above, Mogensen teaches that the fuel can be hydrogen. Mogensen in view of EP '356 and Wallin obviates the fuel cell of claim 16. Upon using hydrogen fuel in the cell of Mogensen in view of EP '356 and Wallin, since the composition of the fuel cell and the fuel used are the same as the instant claim, the prior art will inherently generate the same power output when operated at a temperature of about 550° C.

A claim containing a "recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus" if the prior art apparatus teaches all the structural limitations of the claim. Ex parte Masham, 2 USPQ2d 1647 (Bd. Pat. App. & Inter. 1987). See MPEP § 2114, incorporated herein.

19. Claims 4 and 5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mogensen in view of EP '356 and Wallin as applied to claims 1-3, 6-9 and 12-17 above, and further in view of either U.S. patent No. 6,458,170 (Visco) or U.S. patent No. 5,306,411 (Mazanec).

The teachings of Mogensen in view of EP '356 and Wallin have been discussed above, incorporated herein.

Note: it appears that the use of the starch or carbon is particular to the process of forming pores in the fuel cell and therefore is not readily present in the fuel cell product of the claims since this material forms the pores in the fuel cell. Thus the pore former is not clearly an integral component of the fuel cell and is an intermediary component for

forming pores which is a temporary component of the cell and in order to fabricate the pores of the cell cannot be present, else the pores would not exist in the fuel cell system and ion transport of the cell would be inhibited. However, for the record, such an intermediate component as a pore-forming material is known and obvious.

Visco teaches that it is desired to form a SOFC having a pores therein. In order to form pores in a ceria based material it is well known in the art to impart a starch material in a fuel cell component and thereafter dissolve the starch to form the pores (col. 6, ll. 38-40). Mazanec similarly teaches of the desire to form a porous component in a SOFC (col. 47, ll. 17-23).

The motivation for forming pores in a SOFC fuel cell is to enable and enhance ionic conductivity of the fuel cell system.

The motivation for providing starch in the fuel cell is to effectively form the pores in the fuel cell by dissolving the starch from the fuel cell. The result being a porous component of the fuel cell having enhanced ionic conductivity.

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of Mogensen by providing a starch to the fuel cell since it would have provided a means for forming pores in the fuel cell which would have enhanced the ionic conductivity of the fuel cell.

20. Claim 18 rejected under 35 U.S.C. 103(a) as being unpatentable over Mogensen in view of EP '356 and Wallin as applied to claims 1-3, 6-9 and 12-17 above, and further in view of U.S. patent No. 5,672,437 (Yajima).

The teachings of Mogensen in view of EP '356 and Wallin have been discussed above, incorporated herein.

The difference not yet discussed is of the electrolyte further comprising doped-zirconia.

Yajima teaches of solid electrolyte consisting essentially of cerium oxide can be used in place of a stabilized-zirconia electrolyte . However, if the fuel gas fed on its anode's side is H_2, CH_4 or the like, the cerium oxide contained in the electrolyte may be partially reduced under the effect of the fuel gas at its operating temperature, which can present a problem of a decrease in terminal voltage. The above-mentioned problem can be solved by bonding a thin membrane of stabilized zirconia on the anode's side surface of the cerium oxide electrolyte . Chemical vapor deposition (CVD), electrochemical deposition (EVD), thermal spraying and the like have been proposed as a method for forming the thin membrane of stabilized zirconia (col. 1, ll. 19-31).

The bilayered structure represents an electrolyte wherein the cerium oxide has an interfacial region on the anode side surface of ceria and stabilized (doped) zirconia. This prevents partial reduction of the ceria portion of the electrolyte.

The motivation for incorporating doped zirconia to the doped-ceria electrolyte is that it prevents partial reduction of the ceria portion of the electrolyte from the fuel gas.

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of Mogensen by further providing doped-zirconia with the doped-ceria of the electrolyte since it would have prevented partial reduction of the ceria portion of the electrolyte from the fuel gas.

21. Claims 11 and 19-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mogensen in view of EP '356, Wallin and Yajima as applied to claims 1-3, 6-9, 12-18 above, and further in view of U.S. patent No. 5,932,146 (Kuo) and Weber et al. "Electronic, Ionic and Mixed Type Conductors in SOFC" (hereinafter referred to as Weber).

The teachings of Mogensen in view of EP '356, Wallin and Yajima have been discussed above, incorporated herein.

The doping material in the ceria of Mogensen can be gadolinium oxide, lanthanide oxide and yttria oxide (col. 4, ll. 1-3 as applied to claim 20).

The differences not yet discussed are of using a cathode of a cobalt, iron manganese based material (claim 11) and further of the electrode comprising La-Sr-Co-Fe-Mn-O_3 (claim 19).

The cathode material is desirably a perovskite structure (ABO_3). It is well known in the art to provide air electrodes (cathodes) having a perovskite-like crystal structure of the formula ABO_3, wherein the A-site comprises a combination of a mixed lanthanide and multiple A-site dopants, and the B-site comprises a combination of Mn and at least one B-site dopant. The mixed lanthanide preferably comprises La, Ce, Pr and, optionally, Nd. The A-site dopants include at least one rare earth element selected from La, Ce, Pr, Nd, Sm, Eu and Gd, and at least one alkaline earth element selected from Ca, Sr and B. The B-site dopant is selected from Mg, Al, Cr, Ni, Co, Fe and combinations thereof (see abstract and col. 2, ll. 50-61 of Kuo). Weber further teaches

that the perovskite cathode material is selected from combinations of A-site dopants of (La,Sr,Ca) and combinations of B-site dopants of (Cr, Mn, Fe, Co, Ni) (page 5) and that the particular dopant combinations can be adjusted and varied to optimize the thermal coefficient of expansion resulting in delamination at the cathode/electrolyte interface.

Any combination of these materials would have been obvious to one of ordinary skill in the art to while providing a cathode having a coefficient of thermal expansion which closely matches the other components of the fuel cell and decreasing the internal resistance of the fuel cell.

The motivation for using a cathode of La-Sr-Co-Fe-Mn-O_3 in a fuel cell is that it would have provided an air cathode of a perovskite crystal structure which decreases the internal resistance of the fuel cell.

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of Mogensen by selecting the cathode material to be La-Sr-Co-Fe-Mn-O_3 in a fuel cell since it would have provided a cathode material having coefficient of thermal expansion which closely matches the other components of the fuel cell decreased the internal resistance of the fuel cell. The selection of a known material based on its suitability for its intended use supported a prima facie obviousness determination in Sinclair & Carroll Co. v. Interchemical Corp., 325 U.S. 327, 65 USPQ 297 (1945) See also In re Leshin, 227 F.2d 197, 125 USPQ 416 (CCPA 1960). MPEP § 2144.07.

Further with respect to forming the cathode of claim 11 by colloid spray deposition:

"[E]ven though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process." In re Thorpe, 777 F.2d 695, 698, 227 USPQ 964, 966 (Fed. Cir. 1985) (citations omitted). The Patent Office bears a lesser burden of proof in making out a case of prima facie obviousness for product-by-process claims because of their peculiar nature" than when a product is claimed in the conventional fashion. In re Fessmann, 489 F.2d 742, 744, 180 USPQ 324, 326 (CCPA 1974). Once the Examiner provides a rationale tending to show that the claimed product appears to be the same or similar to that of the prior art, although produced by a different process, the burden shifts to applicant to come forward with evidence establishing an unobvious difference between the claimed product and the prior art product. In re Marosi, 710 F.2d 798, 802, 218 USPQ 289, 292 (Fed. Cir. 1983). Ex parte Gray, 10 USPQ2d 1922 (Bd. Pat. App. & Inter. 1989). See MPEP section 2113.

In the instant case, the prior art rejection obviates the use of a cobalt iron manganese based cathode, thus the end product is obvious. Since the claimed invention is drawn to the fuel cell and not a method of making the fuel cell, the manner in which the cathode is formed is not germane to the claimed invention absent clear evidence to the contrary.

Conclusion

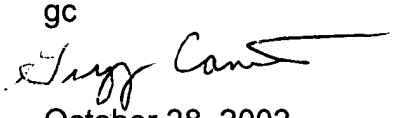
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Gregg Cantelmo whose telephone number is 703-305-0635. The examiner can normally be reached on Monday to Thursday, 8:0-5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Pat Ryan can be reached on 703-308-2383. The fax phone numbers for the organization where this application or proceeding is assigned are 703-308-0000 for regular communications and 703-305-3599 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0000.

Gregg Cantelmo
Patent Examiner
Art Unit 1745

gc



October 28, 2002